Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
TELEPHONE COMPANY-CABLE TELEVISION Cross-Ownership Rules, Sections 63.54 - 63.58	)	CC Docket No. 87-266
	)	
and	)	
	)	
Amendments to Parts 32, 36, 61 64, and 69 of the Commission's Rules to Establish and Implement Regulatory Procedures for Video Dialtone	)	RM-8221

REPLY COMMENTS OF ADC TELECOMMUNICATIONS, INC.

January 17, 1995

TABLE OF CONTENTS

EXECUTIVE SUMMARY

In its *Third FNPRM*, the Commission seeks comment on whether it "should require LECs to employ all digital video dialtone systems." The commenters almost universally agree that the Commission should not mandate an all-digital video dialtone system. Broadband Technologies, Inc. ("BBT"), however, attempts to further its own self-interests at the expense of the public interest by urging the Commission to unnecessarily require LECs to use all-digital video dialtone systems. ADC supports the overwhelming majority of the commenters, who believe that mandating an all-digital video services environment now is not only unnecessary, but also would likely retard the expansion of video services available to the consumer.

Further, digital transmission systems (*i.e.*, fiber-to-the-curb (FTTC)) are not required or preferable to provide video dialtone service and meet the requirement of providing sufficient capacity to serve multiple video programmers. The capacity of a video dialtone platform is *not* determined by the transmission medium but, instead, by the degree to which existing analog video signals are digitized, compressed, and available for consumers to access. Significantly, if the LECs use an analog transmission network (*i.e.*, hybrid fiber/coax ("HFC")) to provide video dialtone service, both analog and digital video services can be delivered to consumers, and consumers are not required to obtain expensive set-top converters to view basic video programming services. In contrast, if the LECs use a digital transmission network to provide video dialtone service, only digital video services are delivered to consumers, who would then need to convert digital video services to an analog format for viewing.

An HFC, not an all-digital, video dialtone approach is the most cost-effective method for delivering video dialtone services. An HFC approach also allows LECs to migrate to an all-digital network, if and when increased consumer demand for digital services warrants such an approach. Thus, ADC firmly believes that the marketplace, not the Commission, should be permitted to determine the appropriate time for a transition from an analog to an all-digital video services environment. To require immediate implementation of all-digital video dialtone systems would force the LECs to use certain technologies to provide video dialtone service before these technologies achieve business and consumer validation and acceptance and before the required digital equipment has been fully-developed.

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REPLY COMMENTS OF ADC TELECOMMUNICATIONS, INC.

ADC Telecommunications, Inc. ("ADC"), by its undersigned counsel, hereby submits its Reply to the comments filed on the Commission's *Third Further Notice of Proposed Rulemaking* in the above captioned proceeding.[1/] As a manufacturer of analog and digital equipment used by local exchange carriers ("LECs") to provide video dialtone service and by cable operators to provide cable service, ADC is extremely knowledgeable with respect to the technical, economic, and operational feasibility of analog, analog/digital, and all-digital platforms for delivering video services to consumers. As shown in this Reply, the Commission should retain its "technology-neutral" approach to video dialtone and permit marketplace forces to determine which of several alternative video dialtone technologies are used to provide video dialtone service.

1/ *Memorandum Opinion and Order on Reconsideration and Third Further Notice of Proposed Rulemaking*, FCC 94-269 (released November 7, 1994), *pet. for review pending sub nom. Bell Atlantic Telephone Companies v. FCC*, (D.C. Cir. Jan. 11, 1995) ("*Reconsideration Order*" or "*Third FNPRM*").

I. STATEMENT OF INTEREST

ADC, incorporated in 1953, designs, manufactures, and markets a wide variety of transmission, networking, and cable management products used in telecommunications, video dialtone, cable television, and private networks. Through its various subsidiaries,[2/] ADC is able to provide its customers comprehensive, end-to-end networking solutions that incorporate, among other technologies, Asynchronous Transfer Mode ("ATM") switching, Synchronized Optical NETwork ("SONET") interfaces, electrical and optical products, and hybrid fiber/coax ("HFC") transmission systems.

Of particular interest to the Commission in this proceeding is ADC's development of the Homeworx access platform -- a transport delivery architecture capable of supporting 80 analog broadcast video channels and 200 (6 Mbps) digital video channels, or some other combination of analog and digital channels, using an HFC network configuration. Significantly, in the Homeworx HFC environment, unlike all-digital systems, subscribers need not purchase set-top converters to receive a greatly expanded range of analog video programming. Only when individual subscribers determine that they wish to receive additional digital or interactive video programming are they required to invest in a set-top converter. The Homeworx access platform also offers LECs the opportunity to make incremental investments in an advanced broadband infrastructure. A moderate initial investment will provide LECs the capability of offering analog broadcast video programming and digital and interactive video services to all subscribers. As

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[2/] American Lightwave Systems, Inc. ("ALS") designs, manufactures, and markets fiber optic video transmission equipment used in cable television, telecommunications, and private networks. Fibermux Corporation designs, manufactures, markets, and installs local area network ("LAN") products. Kentrox Industries, Inc. manufactures network channel terminating equipment using in public and private networks.

demand for new, innovative video services increases, LECs can phase in additional investments as necessary to respond to increased consumer demand for digital and interactive video services and advanced telephony services. Confirming the advantages of the HFC approach, ADC's Homeworx access platform will be used by Ameritech,[3/] Southern New England Telephone ("SNET"),[4/] and Rochester Telephone[5/] to provide video dialtone service to over 1.4 million potential households.

II. INTRODUCTION

For the reasons detailed in these Reply Comments, ADC urges the Commission to continue its successful "technology-neutral" approach to video dialtone. To prescribe an all-digital video services environment now is not only unnecessary, but also would likely retard the expansion of video services available to the consumer. The marketplace, not the Commission, should be permitted to determine the appropriate time for a transition from an analog to an all-digital video services environment. The future may well be all-digital, but, today, video programming and customer premises equipment ("CPE") is analog. To require immediate implementation of all-digital video dialtone systems would force the LECs to use certain

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3/ *Ameritech Operating Companies*, Order and Authorization, FCC 94-340 (released January 4, 1995). The FCC granted Ameritech authority to construct an HFC network to provide video dialtone service to approximately 1.3 million potential households in portions of Illinois, Indiana, Michigan, Ohio, and Wisconsin.

4/ *The Southern New England Telephone Company*, Order and Authorization, FCC 94-297 (released November 22, 1994). The FCC granted SNET authority to construct an HFC network to provide video dialtone service to 150,000 potential households in Connecticut.

5/ *Rochester Telephone Corporation*, Order and Authorization, 9 FCC Rcd 2285 (1994). The FCC granted Rochester Telephone authority to construct an HFC network to provide video dialtone service to 100 potential households in Rochester, New York.

technologies to provide video dialtone service before these technologies achieve business and consumer validation and acceptance and before the required digital equipment has been fully-developed.

There are substantial disadvantages to disturbing the marketplace by a forced utilization of a single, incompletely developed technology. A premature migration to an all-digital environment would require consumers to invest in multiple, expensive set-top devices merely to receive basic video programming services, regardless of their interest in obtaining digital or interactive video services. Requiring an all-digital video dialtone approach also could result in unnecessary investment in network facilities and equipment at the ratepayers' expense. In addition, mandating an all-digital video dialtone approach could result in a premature investment in certain technological solutions, including limited capability set-top boxes, that would require eventual replacement.[6/]

Most importantly, requiring an all-digital approach would be a radical departure from the Commission's general opposition to mandating obsolescence of a proven and accepted technology. As these Reply Comments demonstrate, alternative technologies, such as HFC, satisfy the Commission's "key" requirement that video dialtone systems "provide a common carrier platform containing sufficient capacity to serve multiple video programmers."[7/]

[6/] As the Commission knows from experience in television technology, settling on an early standard may mean a long-term commitment to a second-best technology. The U.S. National Television System Committee ("NTSC") standard is acknowledged as inferior to the PALS television standard implemented abroad.

[7/] *Second Report and Order, Recommendation to Congress, and Second Further Notice of Proposed Rulemaking*, 7 FCC Rcd 5781, 5798 (1992), *pets. for review pending sub nom. Mankato Citizens Tel. Co. v. FCC*, No. 92-1404 *et al.* (D.C. Cir. Sept. 9, 1992) (*Video Dialtone Decision*).

Additionally, HFC technology supports both analog and digital services, is directly compatible with CPE, and permits migration to an all-digital environment, if and when such migration is necessary. HFC technology is thus not only fully-developed today, but also provides a cost-effective way for consumers to access an expanded range of video offerings. Using an HFC approach, LECs will be able to delay a full investment in digital technology until the market warrants such an investment, at which time digital technology will have matured and prices will have fallen.

ADC therefore urges the Commission to maintain a technology-neutral approach that will maximize choice for both consumers and LECs and avoid unnecessary regulatory oversight that would be contrary to the public interest. The Commission's proper role is to establish the permissible contours of a video dialtone offering, and to establish the broad regulatory framework for the provision of video dialtone service, not to specify the technology, network architecture, or functions of a video dialtone offering. The Commission's current technology-neutral video dialtone policy has already resulted in over 30 applications being filed by LECs to construct advanced broadband telecommunications networks capable of delivering competitive analog video services and innovative interactive digital video services to consumers using analog, analog/digital, and all-digital video platforms. The continuation of this policy will further the Commission's video dialtone goals of developing an advanced telecommunications infrastructure, fostering competition in the provision of video services, and providing consumers new and diverse sources of video programming, by allowing marketplace forces -- competition, economics, and consumer demand -- to determine the technology used to provide video dialtone services now and in the future.

III. The Commission's Technology-Neutral Approach To Video Dialtone Serves The Public Interest and Has Resulted In Over 30 Section 214 Applications Being Filed To Provide Video Dialtone Service To More Than 7 Million Potential Households.

A. Commenters Almost Universally Agree That The Commission Should Not Mandate An All-Digital Video Dialtone System.

In its *Third FNPRM*, the Commission seeks comment on whether it "should require LECs to employ all digital video dialtone systems."[8/] Commenters almost universally agreed that the Commission should not mandate an all-digital video dialtone approach. The sole exception was Broadband Technologies, Inc. ("BBT"). BBT attempts to further its own self-interests at the expense of the public interest by urging the Commission to unnecessarily require LECs to use all-digital video dialtone systems.[9/] BBT states that, by requiring all-digital video dialtone systems, the Commission will "encourage LECs to accelerate deployment of integrated broadband networks."[10/] It comes as no surprise that BBT manufactures and markets all-digital integrated broadband fiber-to-the-curb ("FTTC") network products. Significantly, however, the comments filed by other equipment manufacturers, LECs, and video programmers disagree with BBT's position. Moreover, even BBT acknowledges that its all-digital system will not be able to satisfy the one proven consumer demand -- availability of analog video programming -- without the need for expensive set-top converters. BBT's own second generation video dialtone

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8/ *Third FNPRM*, FCC 94-269 at ¶ 270.

9/ *See* BBT's Comments at 28. In the alternative, BBT urges the Commission to (i) require LECs to convert to all-digital systems by a specific date or when certain market conditions have been meet, or (ii) approve applications to build digital video dialtone systems on an expedited basis. As shown below, however, hybrid analog/digital architectures, such as HFC, can simultaneously offer both analog and digital services. An all-digital transmission system is thus not a prerequisite for delivery of digital services.

10/ BBT's Comments at 26.

platform therefore features an analog network overlay to remedy this substantial deficiency, thereby compromising its claim of the superiority of an all-digital approach.

Even AT&T, which recently agreed to jointly develop and market a new switched digital video network with BBT, agrees that the Commission should not require all-digital video dialtone systems. According to AT&T, the Commission correctly concluded in its *Video Dialtone Decision* that the marketplace should determine whether an analog/digital or an all-digital video dialtone network is deployed and that "[t]here is absolutely no reason for the Commission to reverse itself on this issue."[11/] AT&T identified several significant limitations associated with digital technology today, including the additional costs of digital compression and digital set-top converters.

Similarly, Bell Atlantic, which plans to use BBT's all-digital FTTC network approach to deliver video dialtone service to consumers in Dover Township, New Jersey, states that the video dialtone regulatory framework should be technology-neutral and that the Commission should not mandate an all-digital video dialtone system. According to Bell Atlantic:

> [T]he Commission has declined, and should continue to decline, to mandate a particular architecture or technology for video dialtone systems. Rather than requiring deployment of all-digital video dialtone networks, the Commission should permit video dialtone providers to limit the amount of analog capacity offered, as a necessary transitional measure until market forces naturally lead to all-digital networks.[12/]

Other commenters, too, urge the Commission not to mandate an all-digital video dialtone system. Significantly, GTE, whose approach to providing video dialtone service using real-time

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11/ AT&T's Comments at 5.

12/ Bell Atlantic's Comments at 3.

analog-to-digital conversion and compression was referenced in the Commission's *Third FNPRM*, states that "it now appears that widespread use of set top boxes with digital capabilities in the initial phases of GTE's video dialtone deployment is not economically feasible."[13/] GTE explained:

> If video dialtone is to truly develop in accordance with market needs, LECs must be given the flexibility to design operational plans that accommodate evolving capacity needs as new technologies become increasingly economical and their deployment more efficient. Most importantly, the Commission should place reliance on the dictates of the marketplace to insure appropriate utilization of advanced digital technology and services as they become commercially available.[14/]

As a manufacturer of innovative technical solutions for LECs and cable operators to provide video services, ADC strongly agrees with these video dialtone service providers that the rapid pace of technological development, the costs of digital compression and transmission equipment, and the uncertain consumer acceptance of digital and interactive video services, require a technology-neutral approach to video dialtone. If the Commission is concerned about ensuring the availability of a variety of video services, it should not abandon its technology-neutral approach to video dialtone.

B. The Commission Itself Has Recognized That A Technology-Neutral Approach To Providing Video Dialtone Service Is In The Public Interest.

The Commission expressly adopted a technology-neutral approach to providing video dialtone service in its 1992 *Video Dialtone Decision*.

13/ GTE's Comments at 3-4.

14/ *Id.* at 3.

> Video dialtone is technology-neutral; it addressed the barriers that hinder the development of a competitive video marketplace and the efficient deployment of new broadband technologies by the local telephone companies, and defines the regulatory guidelines for the local telephone companies' video distribution services, regardless of the technology used. In fact, we anticipate wide variation in how different local telephone companies may choose to implement video dialtone.[15/]

In that decision, the Commission properly recognized that its role, as regulator, is *not* to specify the technology used to provide video dialtone service.

> It is not our intent, nor our proper role, to specify the technology, network architecture, or functions that a telephone company would offer under video dialtone. Given the rapid pace of technological development in this area, our policy initially sets only the necessary broad regulatory framework and relies upon the technical and market creativity of those in the private sector responding to market demand and economics to determine the substance of telephone company video dialtone offerings.[16/]

The Commission's foresight in adopting this technology-neutral approach to video dialtone and allowing marketplace forces, and not regulatory imperatives, to determine the most appropriate technology for delivering video dialtone services to consumers is the principal reason that the LECs have filed over 30 Section 214 applications seeking to provide broadcast, digital, and interactive video services to over 7 million potential households using asymmetrical digital subscriber line ("ADSL"), HFC, and FTTC technologies.

In reviewing video dialtone applications, the Commission's concern has properly been not the technology proposed, but whether the proposal meets the basic requirements for providing video dialtone service. The Commission's statement in its *Reconsideration Order* that the FCC is not technology-neutral with respect to a video dialtone technology that is unable to meet the

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15/ *Video Dialtone Decision*, 7 FCC Rcd at 5806, n. 104.

16/ *Id.* at 5788-5789.

basic video dialtone requirements is not inconsistent with the overall position of neutrality favored by the Commission and most players in the video marketplace.[17] In spite of BBT's claims, an all-digital video dialtone transmission medium, such as an FTTC network architecture, is not the only technology that is capable of satisfying the basic video dialtone requirements. As the Commission has already recognized, each of the alternative ADSL, HFC, and FTTC network architectures is capable of meeting the video dialtone requirements. The Commission should defer to the LECs' technical, economic, and operational reasons for employing a particular video dialtone network architecture, as long as the offering meets the basic requirements for providing video dialtone service.

C. The Commission's Video Dialtone Public Interest Goals Are Furthered By Allowing Marketplace Economics, Not Artificial Requirements, To Determine The Deployment of Transmission Technologies.

It was not long ago that conventional wisdom held that fiber should go all the way to the home. Fiber-to-the-home ("FTTH"), however, is generally too expensive today to provide video and telephony services to consumers. To limit the costs of deploying fiber, optical electronics can be moved from the home and placed further into the network so that more homes share the cost of this equipment. Because of the magnitude of the required investment, the LECs, in choosing a network architecture to provide video dialtone service, must be responsive to marketplace conditions, such as the cost of digital compression and transmission equipment, the percentage of interactive traffic carried over the network, and consumer demand for video services, in order to make video dialtone services available to more than a few test homes.

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[17] *See Reconsideration Order*, FCC 94-269 at ¶ 34.

Today, there are three principal transmission technologies LECs use to provide video dialtone service: ADSL, FTTC, and HFC. As the cost of fiber optic technology declines, and other digital technologies mature, fiber will migrate to the subscriber. There also may be other, as yet unknown, options for delivering video services to consumers.

1. ADSL.

ADSL technology permits the LECs to provide video dialtone service to consumers over copper-loop facilities. ADSL technology provides for the transmission of voice, data, signaling, and compressed video signals, on an integrated basis, over the telephone company's existing local loop facilities. Video programming provided over an ADSL system must be digitized, compressed, and stored in a video server. Presently, ADSL technology is not capable of transmitting live broadcast programming. Recent developments in encoding, compression, and multiplexing, however, may permit the transmission of live broadcast programming in the near future. Notwithstanding these limitations of ADSL technology, the Commission in its *C&P Telephone Company of Virginia Order* concluded that "in areas where fiber is not yet deployed or cannot be economically deployed, ADSL technology may enable residential subscribers to receive some of the benefits of video dialtone service."[18/] Further, in granting Rochester Telephone Corporation authority to conduct a video dialtone trial, the Commission found that "[s]ince the ADSL System can accommodate multiple programmers, and

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18/ *The Chesapeake and Potomac Telephone Company of Virginia*, Order and Authorization, 8 FCC Rcd 2313, 2315 (1993); *see also Puerto Rico Telephone Company*, DA 94-1384 (released December 5, 1994). The FCC granted Puerto Rico Telephone Company ("PRTC") authority to provide video dialtone service to 18 public schools and 12 businesses using ADSL technology.

capacity does not appear to be limited, the ADSL Systems satisfies the basic elements of video dialtone service."[19/]

2. FTTC.

The Commission also has authorized PRTC and Bell Atlantic to provide video dialtone service using FTTC technology. In an FTTC or "baseband" network, digital video and telephony signals are transmitted as "bits" (*i.e.*, "ones and "zeros") over fiber optic facilities to the "curb." At the "curb," digital video signals are transmitted to subscribers over coaxial cable facilities. An FTTC network is *not*, however, capable of delivering video programming in an analog format unless, of course, an analog HFC overlay network is also built. Thus, a set-top converter is required by consumers in an FTTC network to view any video programming over existing television sets and VCRs. The Commission has authorized Bell Atlantic - New Jersey to provide video dialtone service to 38,000 potential households in Dover Township, New Jersey, using FTTC technology. The PRTC also was granted authority to provide video dialtone service to 250 potential households in Puerto Rico using FTTC technology.

3. HFC.

Significantly, except for the above-mentioned limited applications of ADSL and FTTC technology to deliver video dialtone service to consumers, almost all of the video dialtone applications filed by the LECs seek to provide video dialtone service using HFC technology. An HFC network, where 100 to 500 homes share the cost of optical electronics, is the most cost-

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19/ *Rochester Telephone Corporation*, 8 FCC Rcd at 2286.

effective network architecture for delivering video services.[20] An HFC or "passband" network uses radio frequency ("RF") technology to transport digital and analog video and telephony services over fiber facilities to a central distribution point within a neighborhood. From this distribution point, both analog and digital video signals are transmitted to 100 to 500 subscribers over coaxial facilities. HFC systems offer the capability of transmitting up to 80 analog and 200 (6 Mbps) digital signals, or some other combination of analog/digital channels, to subscribers. Because analog video signals are compatible with existing television sets, a set-top converter is *not* required to receive analog video programming over an HFC network.

Bell Atlantic, NYNEX, Rochester Telephone, SNET, U S West,[21] Carolina Telephone and Telegraph Company, BellSouth, Ameritech, GTE, and Pacific Bell have each been authorized, or have applications pending, to provide video dialtone service using HFC technology. Confirming the Commission's approval of HFC technology, in granting SNET authority to conduct a video dialtone trial using HFC technology to deliver video dialtone services to 150,000 potential households, the Commission concluded that "the construction of advanced telecommunications facilities capable of transporting voice, video, and data services, like hybrid fiber - coax networks, is in the public interest."[22] Even more recently, in authorizing Ameritech to provide video dialtone service to 1.3 million potential households using HFC technology, the Commission concluded that "Ameritech's proposals clearly will produce new

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[20] In comparison, in an FTTC network, optical electronics are placed closer to the home so that only 10 to 25 homes share the cost of the fiber optic equipment.

[21] *U S West Communications, Inc.*, 9 FCC Rcd 184 (1993). In its Omaha, Nebraska, video dialtone trial, U S West is using HFC technology to deliver video dialtone services to 60,000 potential households.

[22] *Southern New England Telephone Company*, FCC 94-297 at ¶ 36.

investment in an advanced telecommunications infrastructure."[23/] Thus, a decision mandating use of all-digital video dialtone transmission systems would fly in the face of very recent Commission decisions validating the use of HFC technology as a video dialtone architecture.

4. An Technology Neutral Approach Promotes Competition and Consumer Choice.

In authorizing video dialtone service, the Commission delineated three broad public interest goals underlying its inauguration of this new service: (i) increased investment opportunities for the development of an advanced telecommunications infrastructure; (ii) competition in the video and communications market, so that free forces, rather than governmental regulation, determine the success or failure of new services; and (iii) additional opportunities for consumer choice of video services.[24/] Realization of these important goals is at risk, however, unless the marketplace, not the Commission, determines the structure of a video dialtone offering. Only by retaining a technology-neutral approach to video dialtone, and not requiring LECs to adopt a specific technology, such as an all-digital FTTC network architecture, will video dialtone continue to drive the development of an advanced

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[23/] *Ameritech Operating Companies*, FCC 94-340 at ¶ 53. The Commission further found that:

> Video servers, video administration modules, remote access modules, host digital terminals, multi-subscriber optical network units and associated software are among the advanced infrastructure components under development. Investment in these components benefits the nation in several important ways. Such investment stimulates manufacturing of high technology products, increases employment opportunities, creates potential export markets, and provides many indirect benefits in other fields, including marketing and training.

[24/] *See Video Dialtone Decision*, 7 FCC Rcd at 5787.

telecommunications infrastructure capable of providing competitive video services to consumers. Additionally, free competition in the U.S. marketplace promotes the competitiveness of U.S. manufacturers worldwide by allowing them to perfect a wide range of products to meet the demanding requirements of U.S. consumers and service providers that then can be marketed abroad to serve requirements there.

Further, the ability of LECs or cable operators to provide analog video programming to consumers is a necessary element of any video services offering because most consumers currently receive analog programming on multiple television sets in their homes without the need for set-top converters. Mandating an all-digital approach, which would result in consumers requiring set-top converters on each of their television sets to view video programming now available in analog format, would undoubtedly hinder the LECs' ability to provide competitive video services and would alienate potential subscribers forced to pay for set-top boxes merely to receive basic video programming services. Moreover, it would force LECs to make unnecessary investments in network facilities and equipment before the marketplace has validated subscriber demand for digital and interactive services and before digital equipment is perfected. Such a result of unnecessary technology selection by the Commission would be contrary to the public interest.

IV. A Hybrid Analog/Digital Approach To Providing Video Dialtone Services Better Serves the Public Interest By Supporting Traditional Analog Video Services and New, Interactive Video Services.

As explained below, if the Commission mandates an all-digital video dialtone approach (*i.e.*, FTTC or FTTH), LECs would be foreclosed from using the mature, readily available HFC technology, which delivers both analog and digital video programming over an RF carrier (*i.e.*,

analog transmission). An all-digital approach also would force consumers to purchase set-top converters, whereas an HFC approach would allow consumers to purchase set-top converters only if they wish to receive digital video programming. Given that the overwhelming majority of the LECs have found the HFC approach to be the most cost-effective method for delivering video programming services to consumers, it would clearly not be in the public interest to disregard this marketplace decision and mandate an all-digital video dialtone approach.

The LECs' ability to provide sufficient capacity to serve multiple video programmers is not based upon whether or not digital transmission facilities are used. Rather, the ability to provide sufficient capacity to serve multiple video programmers is based upon the number of video programmers or video programming sources that a subscriber can access over a LEC's video dialtone platform, which in turn is based upon the degree to which digital video services, not digital transmission equipment, is employed by the LECs. Using an HFC approach, LECs are able to meet the requirement of providing sufficient capacity to serve multiple video programmers by offering subscribers:

- **analog capacity**. Unlike FTTC, HFC supports existing analog services without the need for expensive set-top converters..
- **digital interactive capacity.** Unlike FTTC, HFC supports an unlimited number of video programmers or video programming sources.
- **digital broadcast capacity.**
- **telephony/data capacity.** Such capacity can be provided as copper networks require replacement or in new growth areas.

A. Digital Transmission Facilities Are Neither Required Nor Necessary To Meet the Video Dialtone Requirement of Providing Sufficient Capacity to Serve Multiple Video Programmers.

The ability of the LECs to provide sufficient capacity to serve multiple video programmers is a basic tenet of video dialtone. The Commission's *Video Dialtone Decision* permits the LECs to construct and operate a competitive wireline video distribution system, but requires them to provide a *common carrier* platform capable of serving *multiple* video programmers.[25/] The current state of technology permits LECs or cable operators to provide up to 110 channels of analog video programming over 750 MHz of bandwidth.[26/] By comparison, cable television systems have traditionally provided 50 to 60 analog channels over 550 MHz of bandwidth.[27/] The video dialtone requirement to provide sufficient capacity to serve multiple video programmers has led the Commission to believe that 110 channels of analog video programming may not be sufficient capacity to serve multiple video programmers, even though there is no indication that 110 channels of competitive video programming is insufficient.

One possible technical solution to alleviate analog capacity constraints is to convert analog programming to digital programming and then compress the programming into a smaller bandwidth. For example, if a standard 6 MHz analog video signal is digitized, then the

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25/ Even if these regulatory constraints change, the economic and technical advantages of the HFC system remain. *See* FCC Public Notice, *Commission Adopts Fourth Further Notice In Video Dialtone Rulemaking Proceeding To Examine Telephone Companies Provision of Video Programming*, CC Docket 87-266 (January 12, 1995). The Commission seeks comment on the application of common carriage obligations and cable television rules to telephone companies that seek to provide video programming services.

26/ Through advances in technology, future networks may be able to offer more than 110 analog channels over 1 GHz of bandwidth.

27/ Cable operators are not currently under a common carriage obligation and can serve a single programmer.

bandwidth of that analog signal can support not one analog video signal, but six digitized 6 MHz analog video signals. By digitizing and compressing analog video signals, LECs can increase the capacity of a video dialtone system from 110 channels of analog capacity to 80 analog channels and 200 (6 Mbps) digital channels of capacity, or some other combination of analog and digital channels. This approach does not, however, require an all-digital video dialtone system. Digitized and compressed video signals can be carried over either analog transmission facilities (*i.e.*, HFC facilities) or over digital transmission facilities (*i.e.*, FTTC facilities).

Apparently because of a mistaken belief that an all-digital video dialtone system may be necessary to mitigate analog capacity constraints, the Commission in its *Third FNPRM* requests comment on possibly mandating deployment of all-digital video dialtone systems. An all-digital video dialtone system, however, as shown above, is neither required nor preferable to mitigate analog capacity constraints. Indeed, from an economic and operational point of view, an all-digital approach would in fact severely handicap the LECs' ability to provide consumers competitive video services.

Thus, contrary to the Commission's mistaken belief,[28] analog capacity constraints on programming services are *not* mitigated simply or exclusively by using digital transmission facilities. For example, without digital compression, an FTTC digital transmission network would have a capacity limitation of only 64 channels of video programming (45 Mbps of capacity

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[28] "To the extent digital transmission facilities can be used instead to deliver the same programming, capacity constraints are substantially mitigated." *See Reconsideration Order*, FCC 94-269 at ¶ 268.

per video signal).[29/] In contrast, an HFC analog transmission network would be capable of supporting 110 analog video channels. In order to expand the capacity of analog or digital video dialtone transmission systems, LECs must digitize and compress video signals, which then can be delivered to consumers over analog or digital transmission facilities.

In sum, the capacity of a video dialtone platform is not determined by the transmission medium (HFC, FTTC, or FTTH), but, instead, by the degree to which existing analog video signals are digitized, compressed, and available for consumers to access. Significantly, if the LECs use an analog transmission network to provide video dialtone service, both analog and digital video services can be delivered to consumers. In contrast, if the LECs use a digital transmission network to provide video dialtone service, only digital video services may be delivered to consumers, who would then need to convert digital video services to an analog format for viewing. Thus, both analog and digital transmission systems can meet Commission capacity requirements, but the ability to deliver to consumers analog video programming without the need for set-top converters is a significant advantage of an HFC system.

[29/] As the Commission found in Bell Atlantic - New Jersey's ("NJB's") video dialtone applications, an FTTC network capable of serving only 64 channels of video programming is not consistent with the requirement of providing sufficient capacity to serve multiple video programmers. "NJB's applications, as initially filed, appear to be inconsistent with the video dialtone requirement of a basic common carrier platform through which a multiplicity of programmers can provide video services to consumers." See FCC letter to Edward D. Young, III, Esq., p. 2, File No. W-P-C 6838/6840 (released July 28, 1993).

B. An HFC Network Allows The LECs To Meet The Requirement of Providing Sufficient Capacity To Serve Multiple Video Programmers and Provides Consumers Video Services of Their Choice.

Further, not only has the Commission properly recognized that an HFC approach is in the public interest and allows the LECs to meet the requirement of providing sufficient capacity to serve multiple video programmers,[30/] but an HFC network is also capable of serving more video programmers or video programming sources than an FTTC network.

An HFC network is capable of supporting an unlimited number of video programmers or video programming sources, whereas an FTTC network is limited to serving a maximum of 384 video programmers or video programming sources.[31/] The capacity limitation of an HFC network is the number of subscribers that can simultaneously access the digital services offered over the network. Consider, for example, an HFC network that serves 500 subscribers per fiber/coax node and is capable of providing 80 analog broadcast channels and 200 (6 Mbps) digital interactive channels. A subscriber to this network would be able to receive 80 analog

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30/ *See SNET Authorization*, FCC 94-297 at ¶ 36; *Ameritech Authorization*, FCC 94-340 at ¶ 53.

31/ The technical feasibility of providing 384 channels of capacity over an FTTC network today has been questioned by the Commission. "Given the lack of experience with the proposed technology, there remain significant issues concerning NJB's ability to implement this additional capacity within its proposed timeframe." *See* FCC letter to Edward D. Young, III. at p.2. Although the Commission subsequently approved NJB's video dialtone application, the authorization was conditioned upon NJB's having 384 channels of capacity. *See New Jersey Bell Telephone Company*, 9 FCC Rcd 3677 (1994), *recon. pending.* By requiring all-digital video dialtone systems, the Commission would, in effect, be requiring LECs to adopt an unproven technology.